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## PROBLEMS OF ESTIMATING MILITARY POWER

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### I. INTRODUCTION

With regard to estimating military power there seem to be only problems and very few, well-accepted adequate methods of making such estimates. There are conceptual problems in defining appropriate measures of military power, and many practical problems in carrying out even those partial formulations that seem appropriate. Indeed there are so many problems and difficulties that I can touch on only a few of them.

In this paper I wish to discuss some of the conceptual problems. Next I should like to comment on some of the ways in which military power seems to be measured in current estimates, studies, etc. Sometimes this is done explicitly, but one of the intriguing aspects of the situation is that for many purposes, implicit judgments and estimates of military power have to be made. Some of these implicit

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judgments are of special interest. Finally, I would like to discuss a particular practical difficulty in estimating future U.S. military power, which is related to the problem of forecasting potential enemy military postures beyond more than a few years.

## II. CONCEPTUAL PROBLEMS

Estimating the military power of the United States, or any other country, can only be done relative to that of another country, or set of countries viewed as an alliance. While one often sees statements that the U.S. military forces of 1966 are more powerful than U.S. forces of 1960, it is not clear what this means in many cases since the comparison does not take account of the growing military capabilities of other nations.\* Useful measures or estimates of military power relate to the capability of the military forces of one country to deal with the military forces of another country in a variety of interesting contingencies. In fact, as we shall see in the next section, most attempts to explicitly measure military power are mere tabulations of forces of various sorts: the numbers of men under arms, the numbers of weapons of a given type, etc. This is itself an evasion of the problem of estimating military power, since it says nothing about the actual capabilities of the forces of one country to deal with another. For one thing, the geographical relationships of the countries and the availability of bases and logistic supply conditions are very significant to the outcome of any conflict between

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\* Current statements of the recovery of western Europe make this error. See A. W. Marshall, Determinants of NATO Force Posture, P-3280, The RAND Corporation, January 1966.

the forces described only in these terms. Merely adding up all U.S. forces and comparing them with Soviet forces, actual or potential, present or future, does not really tell one very much. One has to appeal to certain implicit notions as to how military engagements would in fact come out before such listings would have any significance.

On reflection, it is not even clear that military power is a transitive relationship. Until we have defined more explicitly how we are going to measure military power, it is not clear that if A is more powerful than B, and B more powerful than C, that A is more powerful than C.

I know of two attempts to measure military power that go beyond the usual force descriptions that are of special interest. First, is an attempt for certain regions, particularly in Asia, to draw what one might call iso-support contours for the United States and possibly allied powers, as compared with China. These iso-support lines being defined as the line at which a specific number of units can be supported at a standard level of activity as a function of the existing transportation systems over which they would have to be supported. What these tend to show is that even in quite difficult areas such as the northern borders of India, contrary to views often expressed, the position at which the United States and Chinese contours are equal is rather far into the Asian continent. One could attempt to generalize these estimates into sets of contours of the projection of effective military power, by type of military force, by possible opponents singly and in alliance.

Second, the use of cost-effectiveness analysis implies the

development of estimates of military power, since the choice of weapons systems is made a function of their ability to improve military performance in specific contingencies. In such studies, wherever possible, an attempt is made to analyze the outcomes of military conflicts in a range of specific contingencies for alternative designs of U.S. forces, given the likely size and character of enemy forces. Preferred U.S. forces are those that do "best" over the range of contingencies studied. How to define "best" is not easy, since some forces will perform better (in a cost-effective sense) in some contingencies and worse in others. One solution would be to weigh the performance in each of the contingencies in terms of some subjective notions as to the likelihood of the given contingencies and the importance that U.S. forces do particularly well in particular contingencies.\*

Such estimates of military power prepared in the course of studies of preferred U.S. force posture represent, where they exist, the most fully developed and sophisticated attempts to estimate military power. But even for these estimates there remain a number of conceptual problems, such as the proper weighing of the outcome of various contingencies. There are, of course, many other conceptual and practical difficulties in pursuing this method of estimating military power. For example, there is the problem of comparison of the military power

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\* In system analysis or cost-effectiveness studies this problem can often be avoided by the design of dominant programs, at least as compared with current and already proposed programs. But comparison of existing forces and programs is unlikely to exhibit this characteristic.

of one alliance versus another; e.g., the NATO alliance military forces versus the Warsaw Pact military forces. The forces of the various members of the alliances are not entirely complementary, for one thing, so that they should not merely be added up. There will be qualitative differences in the training and support of the forces of the various countries, and the countries are likely in various contingencies to have different interests. Hence the coordination of the forces will not be the same as it might be if all of the forces come from one nation. To measure the military power of alliances, in effect to predict the outcome of military engagements between alliances, therefore poses questions as to the behavior of alliances that lie far beyond our capabilities to answer.

Estimates of future military power depend on predictions as to the likely military contingencies of interest, future military technology available to each of the two supposed opponents, etc. Such predictions are far from certain. Moreover, there are likely to be errors in any method of evaluating military outcomes in particular contingencies. The kinds of calculations that are feasible tend to assume equally adroit handling and use of the forces on both sides. Any review of the history of actual warfare would indicate that these are not the most likely or important situations. We need to have a way of estimating the probable outcomes of military conflicts given the usual amount of human error, misguided doctrine, and stodgy planning so characteristic of actual warfare. Indeed, in the analysis of a wide variety of international relationships and struggles, the most crippling deficiency that I now see is that there does not exist

useful knowledge of, and useful methods of predicting, the likely behavior of national governments, military organizations, etc. Most discussions and forms of analysis tend to treat governments, military organizations, etc., as though they were equivalent to individual rational decisionmakers and not the complicated bureaucratic institutions that they in fact are. We know that decisionmaking within large organizations and government bureaucracy is not like that which is predicted on the basis of models of rational optimizing behavior.

Thus, even in the more sophisticated, though implicit, attempts to make estimates of military power, many of the assumptions are artificial and likely to be considerably in error. The outcome of a military encounter in a particular contingency may be quite different from that predicted by current methods.

### III. STANDARD ESTIMATES OF MILITARY POWER

As mentioned earlier, it is useful to separate current methods of estimating military power into those that are more or less explicit and those that are implicit. I would like to discuss them in that order.

If one looks into the more explicit attempts to estimate military power, it is amazing to see how impressionistic and crude they are. A typical example would be the yearly publication of the Institute of Strategic Studies dealing with the military balance between the Communist bloc and the Western Alliance. These very useful publications proceed by describing the military forces of the various countries in the Communist and Western Alliances, indicate the size of the national population, length of military service, total size of the armed forces,

size of defense budget (if possible in dollars). For each of the services it indicates the number of major units and total manpower, for the Army, for example, the number of divisions of various types, and possibly reserve strength, etc. Similar descriptions of the forces are given for the other services. Some aspects of the equipment of the forces give one an impression of the level of technology available to these forces in terms of modern as compared to more or less obsolescent weapons. For the alliances as a whole, total military manpower is listed. The total number of long-range bomber aircraft and strategic missiles, major naval vessels, and total alliance budgetary expenditures, etc., are shown. This publication of the Institute of Strategic Studies confines itself largely to a description of the forces, leaving to the reader any judgment as to the balance of the military power of the two alliances or of individual countries.

Such impressionistic comparisons as one finds in newspapers, professional journals, et al., are based on very crude measures of total forces available to alliances or individual countries. Occasional judgments are expressed regarding the efficiency of the military leadership of one country as compared with another. Clearly such comparisons avoid any systematic attempt to calculate or estimate on any basis what the outcome might be of specific military engagements or a war between two alliances or countries. Implicitly, as such numbers are used, one tends to be led to expect that equal forces lead to equal power. The whole history of military engagements tends to indicate that that is far from the case, or certainly not an invariable result. One has only to cite the extremely



successful German attack in 1940 on the combined French and British forces to indicate that equality of forces and equipment does not lead to a stalemated outcome.

At another level of discussion of such problems, one does come across judgments as to the balance of forces which allow successful defense, the usual numbers indicating that the offense needs a three-to-one local advantage to succeed.

Still other attempts to discuss what is usually called military potential rather than military power have been based on notions of the mobilization capability, which include manpower and the industrial capacity to support the forces and to supply them with modern equipment. But all of these measures are extremely crude and do not attempt any evaluation of likely military outcomes which any useful estimate of military power ought to do. Many of these measures can be thought of, perhaps, as inputs to an estimate of military power. There has been a gap between (1) the standardization of description of current military forces (and the potential for producing and supporting forces) of various countries -- which can at least form part of the basis for an evaluation of how various military conflicts might come out -- and (2) the standardization of methods of preparing estimates of military power. Typically one is left to make one's own rough judgments based on force descriptions.

Classical military methods of estimating the outcome of military contingencies (or, viewed from an alternative point of view, calculation of forces required to produce a good outcome given assumed enemy forces) often have been rather crude, though perhaps effective for

certain planning purposes. They do take account of the logistics requirements of the forces, in particular geographical locations -- a very important determinant of military effectiveness in most situations. But the evaluation techniques have tended to concentrate on counting up the forces that can be brought to bear by the contesting powers and estimating the likely outcome on the basis of rough planning factors, supplemented by the judgments of experienced military men. Most of these analyses are the by-products of hypothetical planning exercises in which the objective is not so much to measure the military power of the two contending parties in a particular geographic area, but to make plans for what would be required by one of the contestants for attainment of specific goals. As such, these estimates of requirements involve or include margins of safety for one of the countries, based on estimates of the likely size of the forces that the other side will be able to bring to bear.

The fact that estimating procedures are so vague and impressionistic at one level, and so mechanical at another level, is not altogether surprising. As discussed above, the conceptual problems in constructing an adequate or useful measure of military power have not yet been faced. Defining an adequate measure looks hard, and making estimates in real situations looks even harder.

Let me turn now to a discussion of some of the implicit estimates of military power that seem to me most interesting. Earlier I mentioned briefly one type of implicit estimate, that involved in cost-effectiveness status. However, by far the most interesting implicit estimate of military power emerges, I would conjecture, from what one

would call the symmetry syndrome of more standard or, perhaps, classical military planning. This is the typical reaction pattern: If an opponent buys bombers, we tend more to increase our bomber forces, rather than to increase our air defenses; when an opponent deploys an ABM system, we deploy an ABM system. I believe that one of the interesting aspects of the McNamara era in the Pentagon, however, is that this dominant, classical pattern of military force posture planning has been changed. Cost-effectiveness analysis focuses on the possible military outcome of particular military encounters associated with alternative force postures as the basis for choosing weapons systems and planning future force postures. The classical military force planning decision process seems to have involved an attempt to avoid the uncertainties involved in making these kinds of calculations. As has been indicated earlier, such calculations are at best uncertain because of uncertainties in many of the inputs, errors introduced by available methods of analysis, imperfections in the choice and weighing of contingencies, etc. Classical military force posture planning, I believe, involved an attempt to achieve a posture of rough postural symmetry with the potential enemy, subject always to the often inadequate peacetime budgets and a variety of bureaucratic, institutional constraints to be discussed below. Symmetry is defined in terms that if the enemy has so many divisions, the planners say we ought to have so many divisions; if he has so many naval ships of various classes, we should have the same proportional number; the balance of our forces thus would reflect the balance of the enemy's forces. Since such planning

tended to be universal, this led to a stable pattern of forces in each country. Innovation has often been confined to those changes in technology which would lead to technical equipment equivalent or better than that of a potential enemy. Such innovation tended to be confined to improving weapons of existing types. Thus, one could attempt to achieve a situation of symmetry either by building up one's own forces or by obtaining allies with complementary forces.\*

Reliance for success in war has often been put on having better trained manpower and better esprit in one's forces, since these are the factors most under control of national military leaders, and they are moreover the factors they are likely to find as their main peacetime planning problems. It is typical during peacetime that budgets allocated to the support of military forces be below the level needed to support forces to meet acknowledged military needs, treaty obligations, etc. This means that peacetime is a period of contraction for military budgets from past levels, possibly associated with a recent war, and involves for many parts of the military bureaucracy problems of their survival at levels of support that will allow the continued health and well-being of the organization. These problems are especially related to the difficulty of keeping intact the essential cadres of the military officer corps and the non-commissioned officers. The continued health of the organization depends upon being able to recruit people of the right sort, which can only be done if adequate careers can be promised. Therefore in peacetime a good deal of

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\* This is an exaggerated statement of what may be only a specific tendency. Other forces also influence military force posture evolution, especially the historical past.

attention of the organization must be placed on these problems. Hence, a pattern of uncertainty avoidance with regard to many parts of the military planning problem as a whole can be undertaken via the postural symmetry strategy indicated, which allows the military leadership to concentrate on peacetime survival and the maintenance of the well-being and future prospects of their particular part of the total military force.

Another reflection of this tendency to consider symmetrical forces as equal, and therefore an indication of the kind of judgment that people form as to military power, is the following. In the construction of disarmament and arms control plans, it is noticeable that the proposals are almost entirely characterized by the specification of symmetrical postures as the goal, and hence the basis of potential agreement. At the 1958 Surprise Attack Conference, the East and West had quite different views as to the nature of "modern war" and hence different specifications as to what parts of the forces it was most important to monitor so as to give warning and thereby prevent any surprise attack. The conference tended to devote itself, at least superficially, to an attempt by both sides to convince the other that their view was the correct one, and hence that their emphasis as to the types of forces that most needed control and monitoring was correct. In this case, the United States and the Western countries were arguing that strategic forces were the real danger and that surprise attack measures had to provide warning of the launching of missiles, long-range bombers, etc. The Soviets' view of required preparations for attack in "modern war" was a much

more traditional one, even though at that time Khrushchev had already made a number of statements indicating that he personally held a view nearer to the Western one. The Soviet contention was that no surprise attack could be launched without the mobilization of ground forces and their being brought into forward positions, and hence it was sufficient to confine inspection to a narrow zone in Central Europe. Unless disarmament negotiations are viewed in part as an educational effort there is no need to educate the Soviets as to their mistaken notion with regard to surprise attack in the missile age. The West could have, at least as a tactic, proposed a deal -- that is to say: "You think watching ground forces important, we think watching strategic missile forces important -- why don't you watch our ground forces in Western Europe and allow us to watch your missiles?" This sort of proposal was not put forward, even though it would seem tactically a good move. The notion that symmetrical arrangements are the goal is so strong that only proposals of this type tend to be offered, even though the expressed positions of the different parties make it clear that their views of the problem are quite different.

This tendency no doubt in part embodies notions of fairness, but it also represents an attempt to sidestep all the difficulties of a thorough military analysis of the postures resulting from disarmament or arms control schemes.

#### IV. ESTIMATING AN OPPONENT'S FUTURE MILITARY POSTURE

As you will remember, I indicated earlier that an estimate of U.S. military power, if it were to be of a more sophisticated type,

would depend upon several elements:

1. On U.S. military posture, current and future.
2. Descriptions of the current and future posture, or postures, of potential military opponents.
3. Some method of calculating the outcome of military engagements for a set of specified contingencies.

The specification of the contingencies would presumably include not only geographical locations, but scenarios of how the war started; and various other assumptions as to current and future military technology available to the United States and potential opponents, etc.

One of the difficulties of carrying out any such estimates of U.S. military power is that assumptions have to be made concerning all of the above items. An aspect of this problem that has interested me especially is that of estimating an opponent's military posture, and, in particular, his future military posture. Estimating his current posture is a traditional military intelligence problem, and is largely concerned with finding out as much as possible about specified countries' current and past military posture, past R&D and procurement decisions, etc. However, to the extent that one is interested in estimates of an opponent's future military power, the problem changes its nature considerably. While it is true that military force postures change slowly over time, since they are the result of a sequence of yearly decisions on procurement, military policy, budgetary allocation, etc., which affect the military force posture marginally, each year only a relatively small proportion of the military budget of a major military power is in fact available to change the direction of that country's military program. Most of the budget has

to go toward the continuation of programs that have been decided upon in earlier years, and these programs cannot easily be changed. There are also a variety of fixed expenditures relating to military manpower and to various other organizational and overhead functions. Moreover, the same patterns of military expenditure tend to be continued from year to year, and thereby constrain and influence decisions relating to specific weapon procurement programs. Nonetheless, as one attempts to project farther and farther into the future, the degree by which existing military posture and current and past decisions determine the future military posture becomes less and less. So that in making estimates of an opponent's military posture, five, ten, or fifteen years into the future, information about his current posture and current procurement programs becomes less and less valuable. Information concerning R&D programs is more valuable, but even information on current R&D programs does not allow confident estimates of military posture ten to fifteen years into the future.

Some years ago Joseph Loftus and I undertook a number of studies designed to explore a variety of possibilities for improving techniques of projecting national military postures on the basis of incomplete information as to national plans. It had been our contention that new methods of forecasting would be required to produce adequate estimates. For a long time we had believed that studies of the historical developments of military postures of specific nations might lead to useful insights as to the usual patterns in the evolution of these nations' military postures (e.g., patterns in budgetary splits between various missions or bureaucratic entities within the nation's



military establishment; patterns in the phasing in and out of equipment; persistence of a pattern of specific defects in a given nation's military posture; patterns of reaction to changes in United States and allied nations' force postures, etc.).

Whatever our immediate success in suggesting improved methods in forecasting potential opponents' future military forces, an important result, in my eyes at least, was the conclusion (after reconstructing and studying the slow, complicated process of the development of Soviet military forces from the end of World War II through the early 1960's) that existing explanations of past Soviet choices were substantially in error. Most explanations as to why the Soviets had a particular posture some time in the past, or made the choice of a particular weapon, assume that the Soviets had at that time a particular military doctrine, and/or a particular set of objectives that they wished their military forces to serve. The posture choices were then deduced (or explained as resulting) from this assumed Soviet military doctrine, set of political military objectives, etc. The usual method of explanation (and a tendency in making forecasts) is to assume that there is not only a monolithic, unified decisionmaking process which leads to a coherent rational design for Soviet military postures, but that the execution of top level decisions is carried out with little or no friction or resistance from the elements several levels down in the military bureaucracy. Studying the historical development of Soviet military postures made it nearly impossible to believe that this is in fact a useful view of the situation. We came to believe that not only were such assumptions inappropriate in the

sense that they were wrong, but experience had shown to our satisfaction that they did not give (even approximately) likely or valid explanations of the past Soviet force posture, nor could such assumptions give good predictions of future force postures.

Indeed, it seems to me that most attempts to explain the behavior of governments or large governmental bureaucracies are governed by an intellectualist fallacy. Most attempts at explanation put too much weight on what decisionmakers are alleged to think or believe, rather than on the fact that the decisions are made within a large bureaucracy, with all of the attendant difficult problems of political balancing, coordination, information flow, compromising of conflicting objectives, etc.

The key problem, if one is to do a better job of predicting the behavior of governments, military bureaucracies, etc., is to develop useful models of the decisionmaking process in such organizations and to generate and document useful hypotheses concerning the behavior of large governmental institutions and bureaucracies. We need adequate substitutes for the simplified models that tend to be used currently. Models of the decisionmaking behavior of a military organization with regard to force posture as it evolves year by year into the future are more likely to forecast the real future evolution of the force posture if they incorporate the characteristics of an adaptively rational, multiple-objective process, rather than an omnisciently rational, single-objective process. This would lead one to try to treat military bureaucracy in much the same way that Cyert and March have treated business firms in their "Behavioral Theory of the Firm."

Such models and associated ways of thinking about and understanding the decisionmaking process of a large military bureaucracy are not easy to come by. A certain amount can be learned by a judicious reading of memoirs, military journals, and historical materials, although few of these sources are focused in quite the right way.\*

Indeed, for example, much analysis of Soviet military doctrine proceeds on a set of assumptions that I find quite unsatisfactory. Studies of the evolution of Soviet military posture since World War II raise many questions as to what role Soviet publications dealing with Soviet military doctrine in fact play in the Soviet Union. Moreover, such studies raise questions as to whether the role is the same in different historical periods. For example, the Stalin period, which was a period of doctrinal stagnation at least as far as the military journals were concerned, is in retrospect the most revolutionary period since World War II with regard to changes in Soviet force posture. During this period almost all of the major, revolutionary weapons programs were initiated, i.e., the atomic weapons program, the missile programs, the establishment of the major emphasis on air defense, the relative eclipse of the ground support missions, etc. On the other hand, during the middle fifties, following Stalin's death, there occurred a period of considerable discussion of military doctrine and strategy. Some change in Soviet visible military doctrine took place and yet the accompanying changes in military posture were minimal. The early 1960's was another period of active

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\* Sir Basil Liddell-Hart's Memoirs, Vols. I & II, are a notable exception.

discussion of Soviet military doctrine within the Soviet military leadership. At present there is a fairly steady stream of articles of some interest in Soviet journals. But current U.S. analysis of more recent Soviet military doctrinal controversy continues the past tendency to analyze the positions of many of the participants in these doctrinal exchanges in terms such as conservatives or modernists without much regard to the bureaucratic position of the writers. There is not enough analysis of the extent to which individuals may be spokesmen for particular parts of the Soviet military bureaucracy, or to what extent their opinions are personal intellectual positions. The tendency is to assume or to treat the position of a Soviet tank marshal, who in the 1960's period expresses conservative views -- that is, against major innovation in force posture which emphasize rockets and strategic weapons at the expense of conventional forces -- as though it were his personal opinion. In fact his opinions and his statements are probably in large part determined by his role as the chief spokesman for the Tank Forces. Thus, the whole process of the discussion of military doctrine within the Soviet Union tends to be looked at as if it were being conducted by a group of experts trying to reach an intellectual consensus as to what the best Soviet military doctrine should be, what the true nature of modern warfare is, etc., rather than as a reflection of the competition within the Soviet military bureaucracy for resources and for the continued survival and health of specific sub-parts of the Soviet military forces.

Experience at RAND with the SAFE Game (a programming and planning game) shows that even when players on the RED and BLUE side are

constrained in a variety of ways (for example, as to the budgetary split between various missions), the postures they design are too efficient in their use of resources, and reflect too clearly only a single set of possible military objectives, a single coherent military policy, and involve an unusually rapid elimination of ineffective systems inherited at the beginning of the game from the historically determined postures. Also there tends to be a much quicker turnover of systems in the postures, so that the players reach a steady-state situation with much higher than observed percentages of their budgets going into procurement and to R&D, with lower than observed real life operation and maintenance and manpower expenses. The discontinuity of the forces that emerges from this kind of a planning and programming game, with the messy, complicated force postures observed in the real world, is striking.

Studies of decisionmaking within business firms clearly show that there are many limitations on the rationality of the decision-making process of large organizations. Some examples of special interest as characteristic of the decisionmaking process within organizations which might play a role in limiting the adoption of national military postures to changing technological and strategic situations are as follows:

1. Deficiencies in the Generation of Alternatives Submitted to the Top Levels for Decisions. It has been observed with regard to the behavior of firms that when problems arise, the alternatives posed for decision are often confined to a relatively few alternatives generated by the lower levels in the organization. Choice among them, therefore, limits the level of rationality that the decision can achieve. Moreover, the order in which they are

presented may have a strong influence as to the decision. The first alternative which gives satisfactory results may be chosen. Therefore choice is heavily influenced by organizational search procedures.

2. Uncertainty Avoidance Procedures. Again, this aspect of decisionmaking within large firms is important in their behavior, but it is likely to be even more so with regard to military decisionmaking because the uncertainties are so much bigger.
3. Organizational Learning. There seems to be a tendency for organizations to learn and to institutionalize, in one way or another, lessons from the past. The difficulty is that so often the lessons learned from the past are in fact unwarranted generalizations from some particular episode in the past, very often of a particularly pleasant or unpleasant sort. Moreover, there is a tendency to simplify decisionmaking by eliminating alternatives, alleging they are impossible or infeasible. Such judgments are often based upon supposed proofs derived from past experience.

At the moment, real insight as to how behavior of this sort manifests itself in the case of governments, and especially military bureaucracies, is not readily available. Until it is possible to understand, much more completely than we do now, the decisionmaking process within typical military bureaucracies, it is doubtful that we can do an effective job of forecasting likely future military postures beyond those relatively few years into the future, during which the inertia and commitment implied in current posture and current program decisions decisively determine the future posture. In other words, forecasts for planning purposes and estimates which involve implicit estimates of military power beyond about four to five years in the future require an understanding of the decisionmaking behavior of military organization that we do not have. To continue to rely to any extent on the notion that such organizations have a well-defined

consistent set of objectives which they seek to attain with fairly optimal expenditure of the resources given to them by their government is seriously in error.